

~~CONFIDENTIAL~~P. O. BOX 216 - STATION A
COLUMBUS, OHIO

February 27, 1959

lit:
Spec: 90
Wait
Destructor Systems,
*Howie #3 File**Rec'd 6/11*
3/3/59

Dear Sir:

This letter report summarizes the research performed under Task Order No. Z during January, 1959.

During this period, a major portion of the new air-film-cooled incinerator was constructed and fabrication of an experimental paper-feeding mechanism was completed.

Design and Construction of Air-Film-Cooled Incinerator

The design of the air-film-cooled incinerator was illustrated in Drawings D-5901-A and C-5902-A which were sent to you early in December, 1958. During the detailed design work and subsequent preparation of working drawings, a few minor changes were made in the design to facilitate construction. These changes included (1) substituting conventional bolted flanges, 42-in. OD, for the large V-band joints on the outer shell, (2) providing means for detaching the grid from the upper conical section of the liner, (3) including a quick-opening feature on the lower clean-out opening, and (4) reducing the length of each louver from 2 in. to in. and compensating for this change by doubling the number of louvers. On February 3, these changes were discussed with you and a revised version of Drawing D-5901-A was given to you. Further changes in the design of the loading door are being made for ease of operation.

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During January, about two thirds of the fabrication effort on the parts for the new unit was completed. The mild steel outer shell and the stainless steel interior louvered sections were ready for assembly as shown in the photographs which you were given during your most recent visit. We expect that the unit will be ready for preliminary testing by the end of February.

In view of the reduction in the emission of smoke and flames achieved when the flow rate of secondary air was increased in recent test runs, and also in view of the need for additional air for film cooling the new unit, the new design was based on a total air flow rate of 2,400 std cu ft per min at a static pressure of 12 inches of water for maximum burning rates of 500 lb per hr. This air flow rate is about 65 per cent higher than that used in the refractory-lined unit during tests run prior to October 15, 1958, and will require the use of 6.6 brake horsepower to drive a blower of that capacity for the maximum burning rate. At lower burning rates of about 200 lb per hr, the air flow would be throttled and the horsepower requirement would then be within the range of a 5-hp motor. We are now checking the availability of a 5-hp electric motor (220 volt, single phase, series universal) which may be capable of operating for several hours under overload so as to handle the air flows required for the maximum burning rate.

Development of Paper-Feeding Mechanism

A preliminary run was made on February 2, to test the sliding-box-type feeding mechanism under actual burning conditions

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in the refractory-lined incinerator. The capacity of the loading box was approximately 25 pounds; thus, a loading every 3 minutes would be required in order to achieve a rate of 500 lb per hr. The test run showed that the loading could be done at a higher rate for a short period of time and then would have to be stopped until the material near the door was consumed.

The following undesirable features were noted during the test:

- (1) The paper piled up in the area below the door and was not evenly distributed in the incinerator; the inner door and box jammed on the return stroke when the material was piled too high.
- (2) Smoke and fly ash were trapped in the loading box on the return stroke and were released into the room at the loading station; an outer door would be desirable as an aid in minimizing the amount of smoke and fly ash released into the room.

It would be extremely convenient to be able to readily observe the distribution of the paper within the incinerator, and particularly the extent to which piling up has occurred, as a result of operation of the feeding mechanism. Consequently, a sight port will be installed just below the loading-door area in the refractory-lined unit, to facilitate the development of the feeding mechanism,

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and also in the air-film-cooled unit, to aid in the operation under service conditions.

In the meeting with you on February 3, we discussed the results of the test. We then agreed upon the following changes in the mechanism:

- (1) Remove the sliding inner door and replace it with a hinged door located at a position corresponding to approximately 12 inches back from the air-film-cooled liner of the incinerator.
- (2) Replace the loading box with a ram-type mechanism.
- (3) Add a hinged lid with a quick-acting lock to the loading zone, to prevent the escape of smoke and fly ash.

It is expected that the above changes will permit the paper to be hurled across the incinerator so as to be distributed more evenly; and also will eliminate any need for the mechanism or any type of inner door to project into the hot zone of the incinerator during the loading operation. We anticipate that these modifications can be made so that testing can be resumed early in March.

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The total appropriation on this Task Order was \$59,470.
As of February 1, 1959, the unexpended balance was approximately
\$21,400.

Sincerely, 

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ABW:mlm

In Duplicate

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